Receive System for Multiple Payload Swarm (RSMPS)

Completed Technology Project (2017 - 2018)

Project Introduction

This proposed IRAD develops a core part of the communication system for the reception of data transmissions from small free flying payloads. In particular, this portion of the system will consist of the circuitry for the receiver, the automatic gain control (AGC), coarse and fine frequency compensation, demodulation, and data multiplexing for the main payload system. This development is a key part in the complete communication system which will include the main payload receiving system that will process the data transmissions for up to 48 instrumented sub payloads. The communication system will be used on suborbital platforms where telemetry on deployable free flying payloads is required.

The objective of the project is to a have a functional communication system; including filtering, AGC, coarse and fine frequency correction, data demodulation, and data pulse code modulation (PCM) multiplexing.

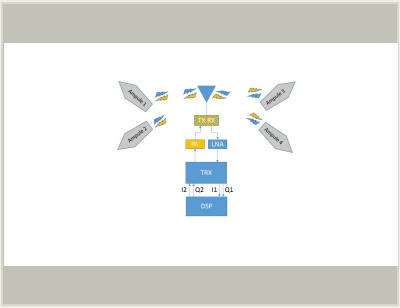
The innovative features of this project:

- Development of a core part (main payload receiving system) of direct link communications between multiple payload bodies.
- Currently, the small size of the deployables prevents the use of off the shelf components to be utilized and necessitates the need for a compact design to meet the specific form factor (Length = 5in, 3.4in Diameter).

At the completion of the IRAD, if awarded, the intent is to produce a printed circuit board (PCB) that will be used for the encoding (for this IRAD, a fixed data pattern will be used) and signal conditioning of the data as well as for the circuitry for the power amplifier (PA) and data handling unit**.**

Anticipated Benefits

- Health and status of chemical release deployable free flying payloads for upper atmosphere research
- Alternative to downlinked data from individual experiment instruments on deployed sub payloads for plasma and high energy astrophysics science that would require additional Ground Station support assets



Payload Swarm

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Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Wallops Flight Facility (WFF)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

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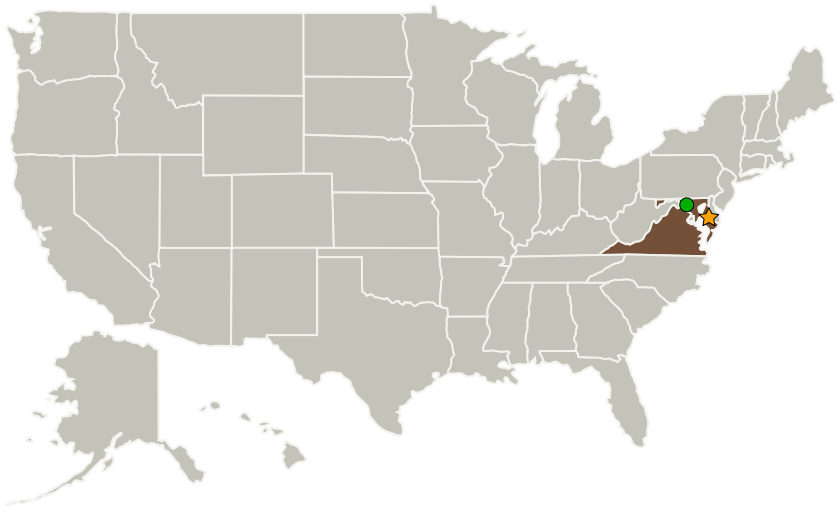
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Wallops Flight Facility(WFF)	Lead Organization	NASA Facility	Wallops Island, Virginia
●Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Virginia

Project Management

Program Manager:

Peter M Hughes

Project Managers:

Daniel A Mullinix
Michael G Hitch

Principal Investigator:

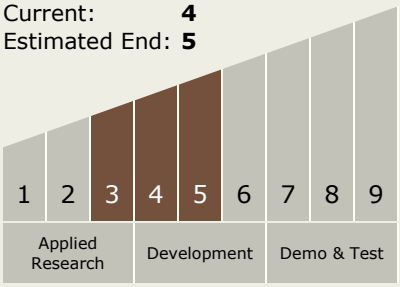
Christian V Amey

Co-Investigator:

Brian H Banks

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **5**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency

Target Destination

Earth

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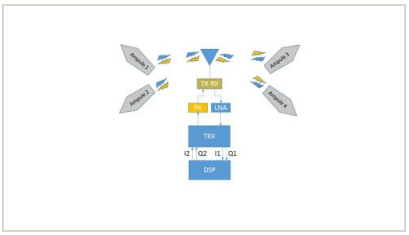
Images



Payload Swarm
Payload Swarm
(https://techport.nasa.gov/image/28244)